

N°1103 / PC

TOPIC(s) : Waste valorization / Homogenous, heterogenous and biocatalysis

Synthesis of new immobilized quaternary ammonium salts and their use as catalysts for the preparation of styrene carbonate from CO₂ and styrene oxide

AUTHORS

Franck LAUNAY / SORBONNE UNIVERSITE - LRS - IPCM, 4, PLACE JUSSIEU, PARIS

Julie KONG / SORBONNE UNIVERSITE - LRS - IPCM, 4, PLACE JUSSIEU, PARIS

Matthieu BALAS / SORBONNE UNIVERSITE - LRS, 4, PLACE JUSSIEU, PARIS

Richard VILLANNEAU / SORBONNE UNIVERSITE - IPCM, 4, PLACE JUSSIEU, PARIS

Catarina CARVALHO ROCHA / SORBONNE UNIVERSITE - LRS, 4, PLACE JUSSIEU, PARIS

Thomas ONFROY / SORBONNE UNIVERSITE - LRS, 4, PLACE JUSSIEU, PARIS

PURPOSE OF THE ABSTRACT

CO₂ increasing concentration in the atmosphere and especially its negative contribution to climate has led to envisage its growing use as a C1 raw material source, for example for the synthesis of cyclic carbonates. The latter are obtained through the carboxylation of epoxides catalyzed by quaternary ammonium salts (QAS) but most of the tests are carried out under homogeneous conditions.

In the present work, preparation of mesoporous SBA-15 supported custom made QAS, bearing a -OH function, was achieved through the nucleophilic attack of N,N dimethylethanolamine over 3-chloropropyl groups previously grafted. The effective formation of the covalently bonded QAS was confirmed by XPS analysis and indirectly by the conversion of styrene oxide into styrene carbonate at 120°C under 15 bar of CO₂. The described material afforded a better carbonate yield (73%) than its homogeneous counterpart (66%) [1]. Such activity enhancement upon functionalization has shown that the support does not only lead to a better recovery of the catalyst but it also brings a synergetic effect of the surface groups.

FIGURES

FIGURE 1

FIGURE 2

KEYWORDS

Carbon dioxide | cyclic carbonate | supported quaternary ammonium salt

BIBLIOGRAPHY

[1] C. Carvalho Rocha, T. Onfroy, J. Pilmé, A. Denicourt-Nowicki, A. Roucoux, F. Launay, Journal of Catalysis, 2016, 333, 29-39.